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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE  
NANTAHALA, PISGAH AND UWHARRIE NATIONAL FORESTS, NORTH CAROLINA

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The aerial sketch map surveys for this evaluation of the French Broad, Grandfather, and Pisgah Ranger Districts, Pisgah National Forest, Tusquitee Ranger District, Nantahala National Forest and the Uwharrie National Forest were a combination of standard sketch map surveys and operational presuppression surveys conducted during late July and August 1976. Aerial surveys were followed by subsequent ground examinations. This evaluation covered a total of 416,662 acres of the Pisgah National Forest, 141,550 acres of the Nantahala National Forest and 43,549 acres of the Uwharrie National Forest (Figures 1, 2 and 3).

These infestations are part of a southwide outbreak involving all 13 states of the Southeastern Area. Results of this evaluation indicate that the current outbreak is declining somewhat throughout most of the National Forests in North Carolina.

METHODS

Standard aerial sketch map surveys were used in this evaluation of the French Broad, Grandfather and Pisgah Ranger District, Pisgah National Forest.<sup>1/</sup> A combination of the FI&DM aerial sketch map survey and the Districts most recent operational presuppression flights were used on the Uwharrie National Forest. On the Tusquitee Ranger District, Nantahala National Forest the latest operational presuppression flight was used for this evaluation. A portion of the spots detected during the aerial

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<sup>1/</sup> Detection of Forest Pests in the Southeast, 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. S&PF 7, Atlanta, GA. 51pp.

phases of the evaluation were examined on the ground to confirm the cause of tree mortality, the percent of spots that were active, the level of activity in each spot and condition of the brood in each.

Ground checks were conducted by personnel of Forest Insect and Disease Management Group with assistance from a number of the Districts. L. C. Loudermilk, Tusquitee Ranger District and R. M. Owen, Uwharrie Ranger District, provided excellent assistance in both the ground and aerial phases of the evaluation.

#### TECHNICAL INFORMATION

##### Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Host - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine. Susceptible southern yellow pines successfully attacked on the National Forests in North Carolina are Virginia (Pinus Virginiana Mill) shortleaf (P. echinata Mill), loblolly (P. taeda L.), pitch (P. rigida Mill) and table mountain pine (P. pungens Lamb.).

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, Ceratocystis spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change to adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

#### RESULTS AND DISCUSSION

The southern pine beetle continues to be a problem on the National Forests in North Carolina. However, it has declined somewhat in intensity on several of the Ranger Districts of the Pisgah and Nantahala National Forests. Ranger Districts where the beetle is still

causing substantial losses are the French Broad, Grandfather and Pisgah of the Pisgah National Forest, the Tusquitee Ranger District of the Nantahala National Forest and the Uwharrie Ranger District of the Uwharrie National Forest.

Table 1-3 summarize the results of this evaluation.

The following is a narrative discussion of the southern pine beetle situation on each District.

#### NANTAHALA NATIONAL FOREST

Tusquitee District - A relatively high level of southern pine beetle activity continues on the Tusquitee District. Spot sizes range from 1 to 1,000 trees with the majority of the spots occurring around Hiwassee Lake and north of Highway 19-129 from Topton to Murphy on the south slope of the Snowbird Mountain range. Spot infestations are also concentrated on the west end of Forest Service lands in the Fires Creek, Indian Grave Gap and Derriberry Gap area (Fig 1). There are an estimated 2.6 spots per M acres of host type with an average spot size of 50 red and fading trees. Ground check data indicated that there are an estimated 166 infested trees per M acres of host type, of which a high concentration are green infested trees. One hundred percent of the spots checked on the ground were active.

#### PISGAH NATIONAL FOREST

French Broad District - Southern pine beetle activity has decreased considerably from last year on the district. In 1975 there were an estimated 1,134 infested trees per M acres of host type and this year 95 infested trees per M acres of host type. This evaluation showed that spot size ranged from 2-300 trees with the majority of the spots occurring north and a little east of Hot Springs in the Little Knob, Roundtop Ridge area (Fig 2). This area is inaccessible for salvage control operations. Aerial survey data showed an estimated 7.9 spots per M acres of host type and an average spot size of 33 red and fading trees. Fifty percent of the spots examined on the ground were actively infested. Very few green infested trees were found during the ground checks.

Grandfather District - A high level of southern pine beetle activity now exists on the District east of Highway 221 and west of Highway 181 (Fig 2). This is the Linville Gorge Wilderness Area, however, most of the spots are west of the Kistler Memorial Highway which is not in the

wilderness area. Another area of concentrated activity east of the wilderness area is located in the Steels Creek drainage just west of Highway 181. Infestations in these two areas are accessible to salvage control operations. Data for this evaluation were stratified to only Forest Service lands and host type acreage east of Highway 221. (Fig 2). Spot sizes in the area ranged from 1 to 300 trees with an average size of 23 red and fading trees. Ground examinations indicated that there are 38 infested trees per M acres of host type. Eighty percent of the spots examined on the ground were actively infested.

Southern pine beetle spot infestations on the western portion of the District that was not included in this evaluation were small with very little activity. The insect population in this area has declined substantially during the past year.

Pisgah District - Southern pine beetle activity on this District has also decreased since last year. Spot size ranged from 2 to 100 trees, with an estimated 22 spots per M acre of host type, and an average spot size of 17 red-fading trees. Ground checks indicated that there are 280 infested trees per M acres of host type. These figures are based on 2,100 acres of host type on the District. Fifty percent of the spots checked on the ground were currently infested. Most of the infestations on the District are inaccessible for salvage control procedures. Spots are mainly concentrated in two areas. One is in the Shining Rock Wilderness Area just north of Cold Mountain. The other location is the Bent Creek Experimental Forest area of the District (Fig 2). The aerial survey also located two spots near the Cradle of Forestry. Some action should be taken to treat these two infestations as soon as possible.

#### UWHARRIE NATIONAL FOREST

Uwharrie District - Southern pine beetle activity is continuing on the District, however, the infestations are not as intense as they were last year. Activity is scattered through the center of the District on both sides of the Uwharrie Trail extending northward to Cedar Rock Mountain (Fig 3). Spot size ranged from 2-200 trees with an average spot size of 27 red and fading trees. There is approximately one spot per M acres of host type. Ground check data indicated that there are 13 infested trees per M acres of host type. Eighty three percent of the spots examined on the ground contained southern pine beetle brood. Infestations on the Uwharrie District are accessible to salvage control operations.

## RECOMMENDATIONS

Current southern pine beetle suppression efforts should be continued on the Grandfather Ranger District, Pisgah National Forest, Tusquitee Ranger District, Nantahala National Forest and the Uwharrie National Forest. The French Broad and Pisgah Ranger Districts of the Pisgah National Forest also have a relatively high number of spot infestations, however, they are inaccessible to control operations. Therefore, southern pine beetle control projects are not recommended on these Districts.

The three Ranger Districts continuing their southern pine beetle suppression projects should follow the guidelines in the 5250 section of FSM and the Southern Pine Beetle Control Plan for the National Forests in North Carolina. During the current evaluations it was evident that some Ranger Districts were not making their operational presuppression flights as recommended in the FSM and their control plan. This is one of the most important phases of the control package and it is recommended that these Ranger Districts make a special effort during FY 1977 to conduct their aerial surveys as outlined in the guidelines.

## REFERENCES

Thompson, J. H. and W. E. McDowell. 1975. Evaluation of southern pine beetle infestations on the Pisgah and Nantahala National Forests, North Carolina. USDA, For. Serv., SA, S&PF, Forest Insect and Disease Management. Rpt. No. 76-1-7

Barry, P. J. and W. E. McDowell. 1975. Evaluation of southern pine beetle infestations on the Uwharrie National Forest, North Carolina. USDA, For. Serv., SA, S&PF, Forest Insect and Disease Management. Rept. No. 76-1-5.

Table 1 Summary of results of southern pine beetle evaluations conducted on the French Broad, Grandfather, and Pisgah Ranger Districts, Pisgah National Forest, 1976.

	Ownership Unit		
	French Broad	Grandfather	Pisgah&(Bent Ck Exp. For)
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type . . . . .	Sketchmap	Sketchmap	Sketchmap
Date of aerial survey . . . . .	8/5/76	8/4/76	8/2/76
Percent survey. . . . .	50%	100%	100%
Total acreage surveyed. . . . .	73,636	187,026	156,000
Total acreage of Forest Service land. . . . .	73,636	110,000	156,000
Susceptible host type acreage of Forest Service land. . . . .	8,300	30,000	2,100
Total number of spots within the survey boundary. . . . .	66	99	47
Total number of spots on Forest Service lands . . . . .	66	78	47
Spots per M acre of host type Forest Service lands. . . . .	7.9	2.6	7.9
Average spot size (trees) Forest Service lands. . . . .	33	23	22.4
Range of spot sizes (trees) Forest Service lands. . . . .	2-300	1-300	2-100
Reds and faders/M acres host type on Forest Service lands . . . . .	261	57	389
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase. . . . .	8/12/76	8/18/76	8/9/76
Infested trees per M acre of host type Forest Service lands . . . . .	95	38	280
Total number of infested trees on Forest Service lands. . . . .	787	1,149	588
Total volume of infested trees on Forest Service lands. . . . .	46 MBF	91.5 MBF	94 MBF
Total number of affected trees on Forest Service lands. . . . .	2,559	3,271	3,370
Total volume of affected trees on Forest Service lands. . . . .	149.5 MBF	260 MBF	541 MBF
Ratio of green infested to total red and fading trees . . . . .	1:7.33	1:2.85	1:15

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

Table 2. Summary of results of southern pine beetle evaluations conducted on the Tusquiee Ranger District, Nantahala National Forest and the Uwharrie Ranger District, Uwharrie National Forest, 1976.

	Ownership Unit	
	Tusquiee R.D.	Uwharrie R.D.
	Nantahala NF	Uwharrie NF
<b>1. Results compiled from data collected during the aerial phase of the evaluation:</b>		
Survey type . . . . .	Sketchmap	Sketchmap
Date of aerial survey . . . . .	7/24 & 8/3/76	8/11/76
Percent survey . . . . .	100%	100%
Total acreage surveyed . . . . .	141,550	43,459
Total acreage of Forest Service land . . . . .	141,550	43,459
Susceptible host type acreage of Forest Service land . . . . .	34,658	31,200
Total number of spots within the survey boundary . . . . .	92	21
Total number of spots on Forest Service lands . . . . .	92	21
Spots per M acre of host type Forest Service lands . . . . .	2.65	.67
Average spot size (trees) Forest Service lands . . . . .	50	27
Range of spot sizes (trees) Forest Service lands . . . . .	1-1,000	2-200
Reds and faders/M acres host type on Forest Service lands . . . . .	132	18
<b>2. Results compiled from data collected during the ground and aerial phases of the evaluation:</b>		
Date of ground phase . . . . .	8/5/76	8/26/76
Infested trees per M acre of host type Forest Service lands . . . . .	166	13
Total number of infested trees on Forest Service lands . . . . .	5,737	399
Total volume of infested trees on Forest Service lands . . . . .	393 MBF	45 MBF
Total number of affected trees on Forest Service lands . . . . .	8,015	949
Total volume of affected trees on Forest Service lands . . . . .	549 MBF	108 MBF
Ratio of green infested to total red and fading trees . . . . .	1:1.37	1:3.11

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

Table - Summary of Aerial Survey Data - 1/ Southern Pine Beetle Evaluation on the National Forests of North Carolina

Ownership	Infestation Size (# Trees)						Total
	2-5	6-20	21-50	50+100	100+		
:Singles : Spots ; Trees : Spots : Trees : Spots : Trees : Spots : Trees : Spots : Tre							

Nantahala NF

Tusquitee R.D.	8	11 : 52	41 : 605	19 : 850	7 : 675	6 : 2400	92 : 4590
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Pisgah NF

French Broad R.D.	-	21 : 69	23 : 228	8 : 270	11 : 860	3 : 738	66 : 216
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Grandfather R.D.	5	35 : 120	29 : 294	3 : 158	1 : 75	5 : 1050	77 : 170
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Pisgah R.D.	-	14 : 45	23 : 288	8 : 320	2 : 164	- : -	47 : 81
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Uwharrie NF

Uwharrie R.D.	-	8 : 17	5 : 87	6 : 263	1 : 75	1 : 200	21 : 575
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1/ Corrected and expanded to 100%.

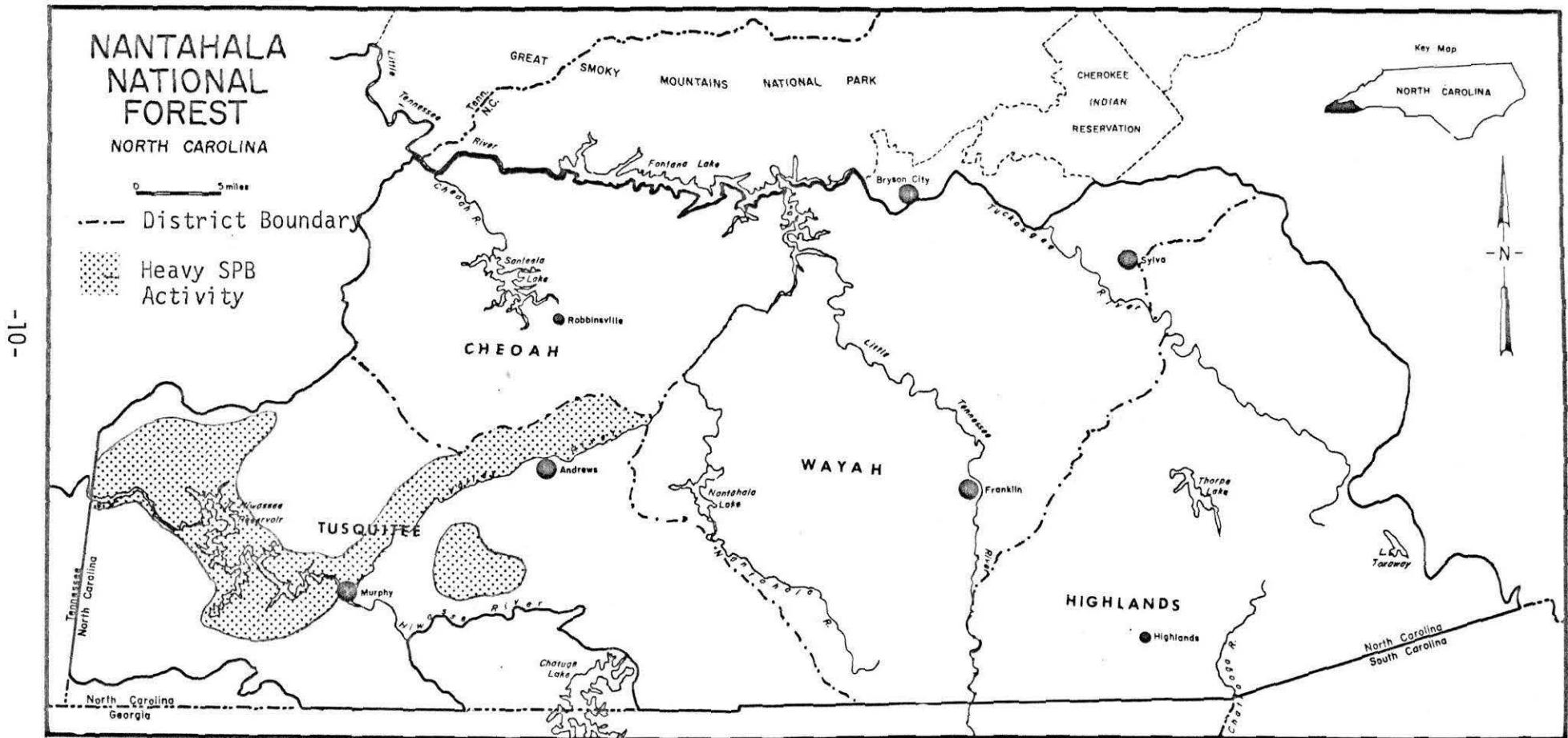


Figure 1. Location of Southern Pine Beetle Evaluation, Tusquitee Ranger District, Nantahala National Forest, 1976

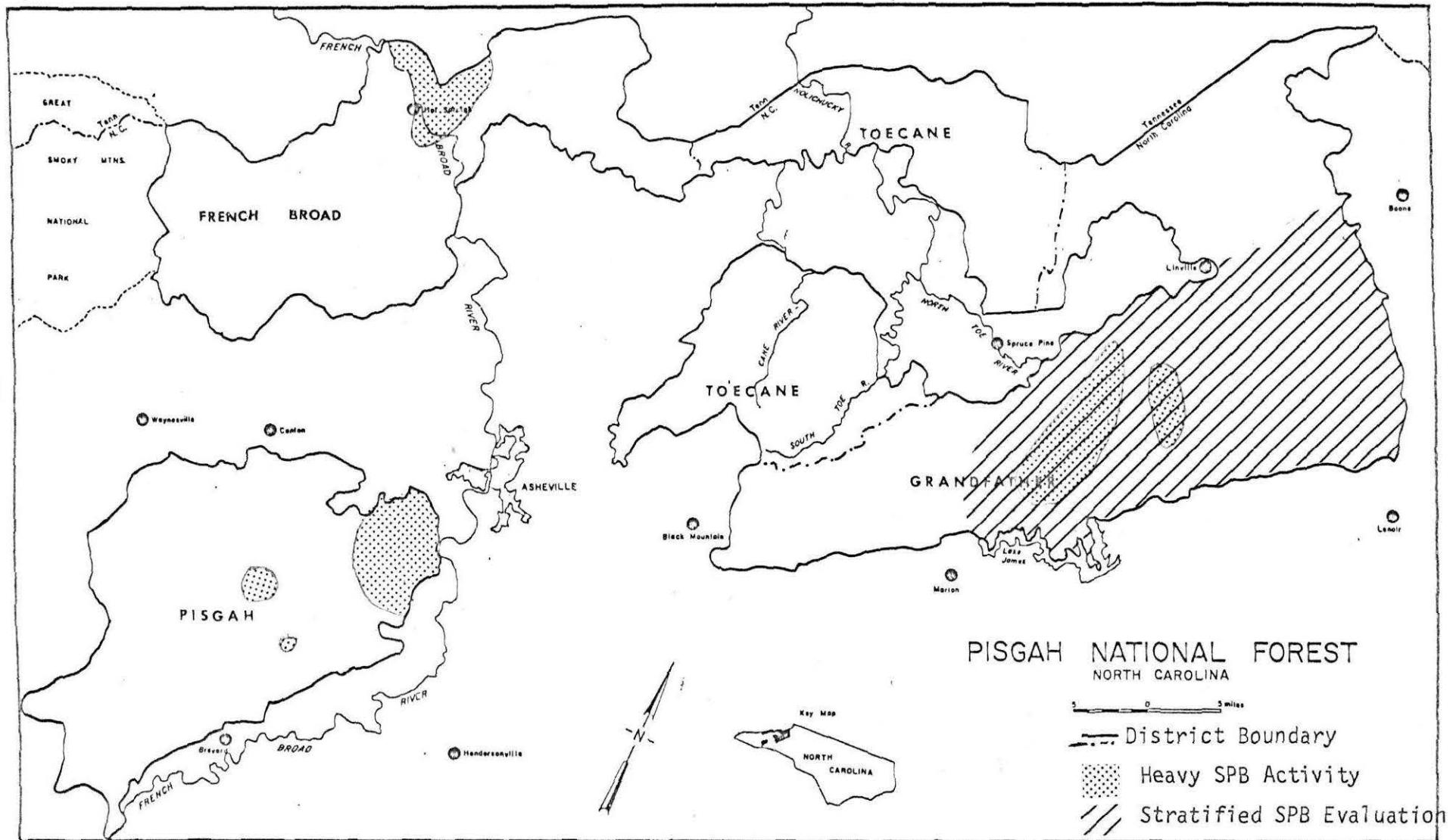


Figure 2. Location of Southern Pine Beetle Evaluation, French Broad, Grandfather and Pisgah Ranger Districts, Pisgah National Forest, 1976.

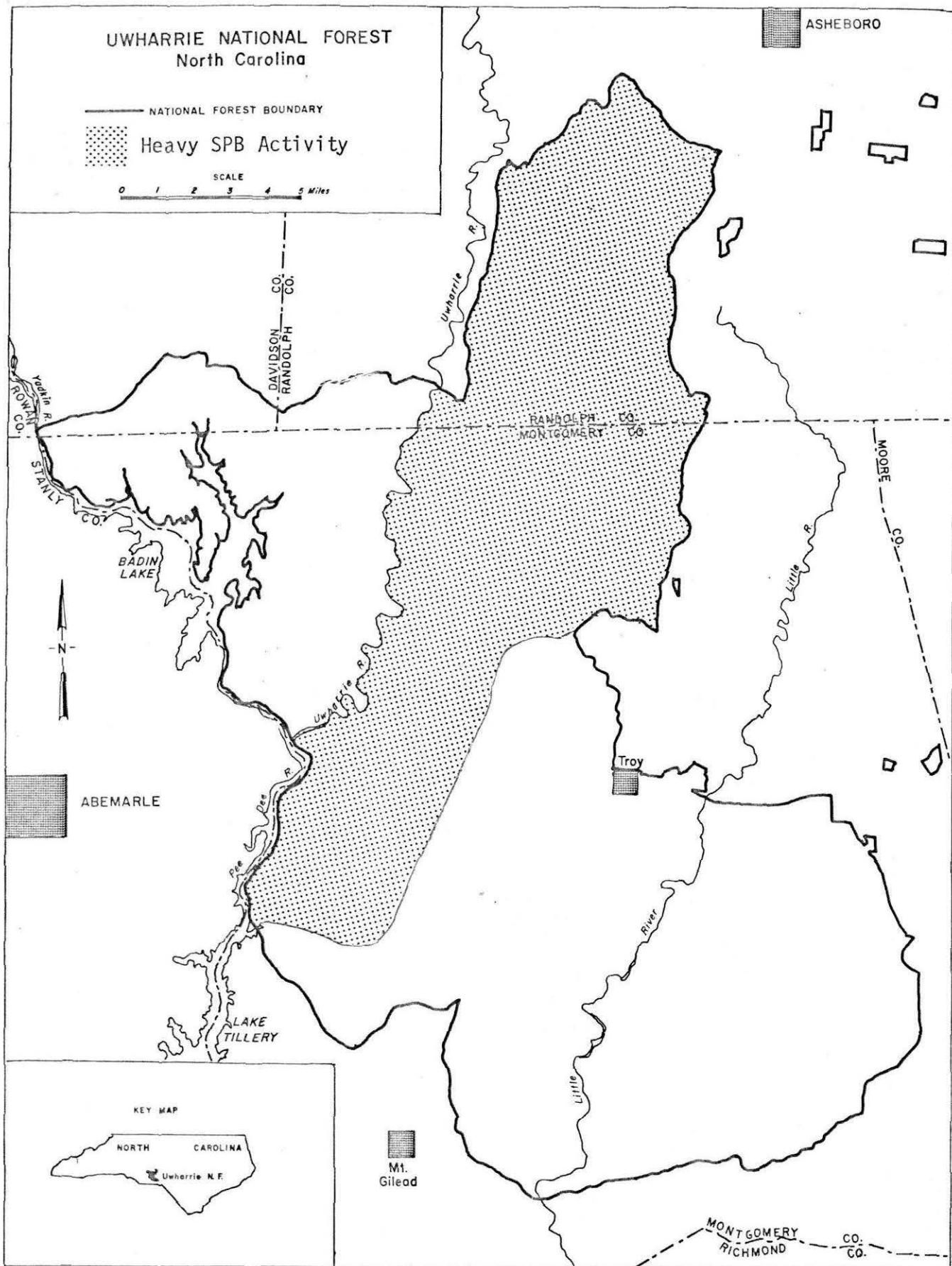


Figure 3. Location of Southern Pine Beetle Evaluation, Uwharrie Ranger District, Uwharrie National Forest, 1976.